Remarks

Examiner Lavilla is thanked for the thorough Office Action.

In the Claims

The claims are amended as discussed below. Note that all amendments to the claims not in response to prior art rejections. No new matter is added.

Claims 1, 8 and 31

Twice amended parent Claim 1, lines 3-6, is amended to delete the limitation of the composition of the seed layer. The limitation is added as new claim 31. This limitation is not shown in the prior art.

Twice amended parent Claim 1, L 10, is amended to add the limitation of the composition of the Free Ferromagnetic layer. This overcomes the 35 U.S.C. §112 rejection below. For support see claim 8 and See Spec. p. 13, L 1-20.

Claim 8 is amended to delete the duplicate limitation.

Claim 14

Claim 14 is amended to correct a typographical error.

Claim 15

Second parent claim 15 is amended to add the limitation of the composition of the Free Ferromagnetic layer. This overcomes the 35 U.S.C. §112 rejection below. For support see claim 8 and See Spec. p. 13, L 1-20.

Claims 18, 25 and 32

Twice amended parent Claim 18, lines 2-4, are amended to delete the limitation of the composition of the seed layer. The limitation is added as new claim 32. This limitation is not shown in the prior art.

Parent claim 18 is amended to add the limitation of the composition of the Free Ferromagnetic layer. This overcomes the 35 U.S.C. §112 rejection below. For support see claim 25 and See Spec. p. 13, L 1-20.

Dependent claim 25 is amended to delete the duplicate limitation.

New claim 33

New claim 33 is added. New claim 33 contains the limitations twice amended claim 1 the the exception of the limitation of "**said metal oxide buffer layer is comprised of an metal oxide having a crystal lattice constant that is close to said free ferromagnetic layer's crystal lattice constant and has the same crystal structure as said free ferromagnetic layer's crystal lattice structure;".** For support see spec. p. 7, lines 14-16; See abstract lines 1 to 3.

CLAIM REJECTIONS:

Rejection of claims 1-30 under 35 U.S.C. §112

The rejection of claims 1-30 under 35 U.S.C. §112 first para is acknowledged. Reconsideration and withdrawal of the rejection is respectfully requested in view of the amendments.

Parent claims 1, 15, 18 and 33 have limitations/elements that claim the important features of the metal oxide buffer layer and free ferromagnetic layer. Furthermore, parent claims 1, 15 and 18 claim the preferred compositions of the metal oxide buffer layer and free ferromagnetic layer that meet the above requirements.

CONCLUSION

In conclusion, reconsideration and withdrawal of the rejections are respectfully requested. Allowance of all claims is requested. Issuance of the application is requested.

It is requested that the Examiner telephone the undersigned attorney George Saile at (845) 452-5863 should there be anyway that we could help to place this Application in condition for Allowance.

Respectfully submitted,

Steve Ackerman
reg no. (37,761)

Version with markings to show changes

In the Claims

1. **(TWICE AMENDED)** A method for forming a giant magnetoresistive (GMR) sensor element comprising:

forming a seed layer over a substrate, [the seed layer being formed of a magnetoresistive resistivity sensitivity enhancing material selected from the group consisting of nickel chromium alloys, nickel -chromium-copper alloys and nickel-iron-chromium alloys;]

forming a metal oxide buffer layer over the seed layer; said metal oxide buffer layer comprised of NiO or alpha Fe_2O_3;

forming a free ferromagnetic layer over said metal oxide buffer layer; said free ferromagnetic layer is comprised of: CoFe, CoFe/NiFe, or Co/NiFe;

forming a non-magnetic conductor spacer layer over said free ferromagnetic layer;

forming a pinned ferromagnetic layer over the non-magnetic conductor spacer layer ; and

forming a pinning material layer over the pinned ferromagnetic layer; and

forming a capping layer over said pinning material layer.

8. **(TWICE AMENDED)** The method of claim 1 wherein said free ferromagnetic layer [is comprised of: CoFe, CoFe/NiFe, or Co/NiFe and] has a thickness of 20 to 30 Å.

14. **(AMENDED)** The method of claim 1 wherein the [spin filtering] giant magnetoresistive (GMR) sensor element is selected from the group consisting of simple spin valve magnetoresistive (SVMR) sensor elements, synthetic antiferromagnetically biased giant magnetoresistive (GMR) sensor elements, simple spin filter giant magnetoresistive (GMR) sensor elements and spin filter synthetic antiferromagnetically biased giant magnetoresistive (GMR) sensor elements.

15. (AMENDED) A method for forming a spin filter giant magnetoresistive (GMR) sensor element comprising:

forming a seed layer over a substrate, said seed layer being formed of a magnetoresistive resistivity sensitivity enhancing material selected from the group consisting of nickel chromium alloys, nickel -chromium-copper alloys and nickel-iron-chromium alloys;

forming a metal oxide buffer layer over the seed layer; said metal oxide buffer layer comprised of NiO or alpha Fe_2O_3 [$Fe2O_3$];

forming a high conductivity layer on said metal oxide layer;

forming a free ferromagnetic layer over said high conductivity layer; said free ferromagnetic layer is comprised of: CoFe, CoFe/NiFe, or Co/NiFe;

forming a non-magnetic conductor spacer layer over said free ferromagnetic layer;

forming a pinned ferromagnetic layer over the non-magnetic conductor spacer layer ; and

forming a pinning material layer over the pinned ferromagnetic layer;

forming a capping layer over said pinning material layer.

18. (AMENDED) A spin valve giant magnetoresistance (SVGMR) sensor comprising:

a seed layer over a substrate, [said seed layer being formed of a magnetoresistive resistivity sensitivity enhancing material selected from the group consisting of nickel chromium alloys, nickel -chromium-copper alloys and nickel-iron-chromium alloys;]

a metal oxide buffer layer over the seed layer; said metal oxide buffer layer comprised of NiO or alpha Fe_2O_3;

a free ferromagnetic layer over said metal oxide buffer layer; said free ferromagnetic layer is comprised of: CoFe, CoFe/NiFe, Co/NiFe;

a non-magnetic conductor spacer layer over said free ferromagnetic layer;

a pinned ferromagnetic layer over the non-magnetic conductor spacer layer ; and

a pinning material layer over the pinned ferromagnetic layer; and

a capping layer over said pinning material layer.

25. (TWICE AMENDED) The spin valve giant magnetoresistance sensor of claim 18 wherein said free ferromagnetic layer [is comprised of: CoFe, CoFe/NiFe, or Co/NiFe and] has a thickness of 20 to 30 Å.

Please add new claims as follows:

31. The method of claim 1 which further includes said seed layer being formed of a magnetoresistive resistivity sensitivity enhancing material selected from the group consisting of nickel chromium alloys, nickel -chromium-copper alloys and nickel-iron-chromium alloys.

32. The spin valve giant magnetoresistance sensor of claim 18 wherein said seed layer being formed of a magnetoresistive resistivity sensitivity enhancing material selected from the group consisting of nickel chromium alloys, nickel -chromium-copper alloys and nickel-iron-chromium alloys.

33. A method for forming a giant magnetoresistive (GMR) sensor element comprising:

forming a seed layer over a substrate,;

forming a metal oxide buffer layer over the seed layer; said metal oxide buffer layer comprised of NiO or alpha Fe_2O_3;

forming a free ferromagnetic layer over said metal oxide buffer layer; said metal oxide buffer layer is comprised of an metal oxide having a crystal lattice constant that is close to said free ferromagnetic layer's crystal lattice constant and has the same crystal structure as said free ferromagnetic layer's crystal lattice structure;

forming a non-magnetic conductor spacer layer over said free ferromagnetic layer;

forming a pinned ferromagnetic layer over the non-magnetic conductor spacer layer ; and

forming a pinning material layer over the pinned ferromagnetic layer; and

forming a capping layer over said pinning material layer.